

10. Future Work

Previous sections mentioned future modifications and improvements to the UV and Vis/NIR SCFs. This section will discuss these changes and other future work. Several publications are planned to describe these modifications and improvements to the SCFs. This publication describing the measurement services offered by the UV and Vis/NIR SCFs will be revised every 3 to 5 years.

One of the first additions will be to temperature control the UV and Vis/NIR SCFs' silicon working standards. A comparison of the UV SCF working standards to the SURF III [63] responsivity scale is planned in the near future. A long-term study is ongoing to find new UV detectors with better responsivity, uniformity, and stability.

Several major modifications will be made to the UV SCF. A new, higher efficiency UV monochromator (with automated order sorting filters) and larger linear translation stages have been purchased and will be integrated into the UV SCF when the measurement schedule allows. The translation stages will replace the rotating stage and small linear stages that have limited the UV SCF to measuring only one test detector at a time. The new stages will be configured similar to the Vis/NIR SCF stages. Additional imaging mirrors for astigmatism correction will be added to the UV SCF similar to the Vis/NIR SCF.

A higher accuracy, computer-addressable wavelength encoder will be added to the Vis/NIR SCF to improve the wavelength control. Additional modifications to improve the measurement service are high-accuracy aperture measurements [68], automated control of the amplifier gains, and a computer interface (via IEEE-488 bus) with customer-supplied test equipment.

As seen in the uncertainty assessment, the measurement uncertainty was significantly affected by the poor response of the pyroelectric detector in the SCFs. A flat detector with lower noise equivalent power (NEP) and higher SNR would be better suited for the power levels in the SCFs. There are efforts currently underway at NIST to develop better spectrally flat detectors. One is a silicon bolometer [69, 70] designed as a standard with the new IR SCF covering 2 μm to 20 μm [71, 72]. Since the bolometer has a flat response, it can also, in principle, be used below 2 μm in the UV, visible, and near-IR.

11. Acknowledgments

The development, operation, and evolution of this measurement service has involved several NIST personnel. The major contributors have been: Bob Saunders and Jeanne Houston for constructing the Vis/NIR SCF; Ed Zalewski and Jeanne Houston for their work establishing and operating the Detector Response Transfer and Intercomparison Program (DRTIP); and Joel Fowler for the design of the DRTIP electronics. Chris Cromer added the UV SCF, enhanced the computer automation, and started the sales of silicon photodiodes as part of the measurement service.

The authors would like to thank Tom Gentile, Jeanne Houston, Jonathan Hardis, Chris Cromer, and Chris Classon for their work with the HACR and the traps; Joel Fowler for providing the transimpedance amplifiers; and Bob Saunders for his informative discussions on